Transportation Operations—A Core Mission of the FHWA

The following is a summary of a presentation given by Dr. Christine M. Johnson on Aug. 2, 1999, as part of the 69th ITE Annual Meeting in Las Vegas, Nev., USA.

BY CHRISTINE M. JOHNSON

IN FEBRUARY 1999, THE FEDERAL Highway Administration (FHWA) announced a restructuring and reorganization, the depth and breadth of which has not been undertaken in several decades. It culminates nearly a decade of discussion and struggle within the agency that began under Federal Highway Administrator Thomas Larson in the early l990s to answer the question, "What is our post-interstate mission?"

The restructuring reflects the agency's answer to that question. We have realigned the organization around fundamental missions, or core businesses that will help us achieve the agency's vision of creating the best transportation system in the world.

We remain in the business of infrastructure—building it, maintaining it and ever improving its quality and functionality—but we have expanded our core mission, for the first time, to include a mission of operating the system—actively managing its performance—safely (a third core business) and efficiently, and in harmony with the human and natural environments (the fourth core business).

That formal declaration of "operations" as a core mission of the agency is a watershed policy statement. It is built on research and program initiatives, some of which began over three decades ago.

Some of us remember the Electronic Route Guidance research initiative. More of us remember the Traffic Operations Program to Increase Capacity & Safety, followed by the planning guidance, which asked us to look at *systematic* management of our transportation systems under the Transportation Systems Management (TSM) program. Then there was the promotion of ridesharing, high-occupancy-vehicle (HOV) lanes, congestion pricing, Congestion Management Systems and Intelligent Transportation Systems (ITS), which many of you correctly perceived as TSM repackaged with a little more "sizzle."

But these programs have in many ways been "add-ons"—the ketchup and mustard, if you will, to the main course—in this case to the building and preserving of infrastructure, or "Getting the federal program out."

What makes the "operations core mission" different from this past parade of programs—bells and whistles added to our primary mission of construction? The title says a lot. In the past it was the ride sharing *program*—lodged in planning; or *traffic operations*—lodged in the technology group; or *ITS*—which did not fit anywhere. All of those activities have been acknowledged as components of a larger whole—a mission parallel to construction.

But frankly that is about as far as it goes. Realizing the promise behind this watershed policy statement depends a lot on:

1. How we define an operations mission;
2. Whether we can develop an understandable vision—in the same way we created a vision for an interstate construction program;
3. Our ability to then deliver on that vision in a way that adds value for the American public; and
4. Finally, on whether we can create the same kind of local and national political constituencies that exist for the asphalt and concrete, environmental and safety missions.

I would like to share some of my thoughts as I have looked at this daunting challenge of defining a national "operations" mission for the FHWA.

THE TIME IS RIGHT

Let us start with a brief analysis: What is our environment? What is the lay of the land? I might sum it up this way: The stars are currently aligned;

indeed many, many things seem to be in alignment for a major leap forward in "operations." But the lay of the land is rocky and filled with land mines at best, possibly impenetrable at worst. Let me explain.

Need

The political demand to "do something" is there:

- 200 million registered vehicles;
- Annual vehicle miles of travel (VMT) is almost 2.5 *trillion* miles;
- VMT is expected to grow by 30 percent in the next decade;
- 4.2 million ton-miles of freight are moved on our highways every year. That is more than 25 tons per person! That number will continue to grow;
- There are six million crashes every year, including 41,000 fatalities! What about the system impacts of six million crashes?;
- Congestion costs the United States $48 billion in lost productivity and will continue to grow; and
- *People hate sitting in traffic!*

Some would argue that political imperative was answered with the passage of the Transportation Equity Act for the 21st Century (TEA-21) that included a 40 percent increase in capital funding. Perhaps this is true, but I do not think that we have fully reckoned with a second political imperative that most Americans want: mobility *and* livability—variously defined as environmental consciousness, sustainability, etc.

Mainstream America tacitly supports the environmental activists in slowing down the bulldozers. Moreover, in many places we have run out of room and that 40 percent funding increase still will not cover the bill for maintaining and rebuilding what we have. So there is a need to "do something," but not necessarily the same thing we have done before.

Opportunity

The technology has matured to operate the system in ways that we could only dream of even a decade ago—communications, computing power, etc. Our ability to obtain information on what is happening on the surface transportation network has skyrocketed—between cell phones, cameras, sensors and global positioning satellites. Data are cheap and plentiful, and our ability to tell our customers what is going on has likewise exploded.

Public Appetite

Our appetite for information has grown. Metro Networks alone operates in over 80 markets in this country and serves over 2,000 radio and television-station affiliates in over six countries. Dozens of traffic and traveler information sites can be found on the Internet. Surveys show that people have had it with the "traffic" problem (usually meaning nonrecurring congestion).

As we live lives and run businesses with more and more information, our tolerance for "surprises"—being out of control (say in a three-hour traffic jam)—will be less and less personally tolerable and more and more costly.

Funding and Policy

TEA-21 has dozens of references to some form of operations policy. Operations is now a significant factor in planning. The cost of operating traffic management systems can now be paid for with federal funds—indefinitely. ITS was made explicitly eligible for federal funding.

Political Will

Performance-based public administration is sweeping state and local government. Government is becoming concerned with the customer. Motor vehicle departments stay open at night! Better yet, some handle registration over the Internet! Jury summonses are beginning to be sensitive to the real-life demands of prospective jurors. Taxes and fines can be paid online.

We are starting to test students at regular intervals, report the results and hold teachers accountable. Other public report cards are emerging on crime, garbage—the things that really affect people's daily lives. How far behind can traffic be—speaking of affecting people's daily life? In this kind of environment how much longer can we pursue a policy of build it and forget it?

The need is there. The technology is there. The public appetite for traffic information is there. And, growing funding is there. Even the political winds seem to be shifting in our direction. But why are traffic operations centers not popping up all over the country? Why has there not been a landmark shift in funding devoted to operating our streets and highways? Why isn't *everybody* talking about a renaissance in surface transportation operations?

I have asked myself these same questions. Indeed when I talked to a few audiences after taking on this new challenge in FHWA, I heard some very interesting reactions:

- Politicians do not understand the benefits of (fill in the blank). They just want to cut ribbons;
- Until we can show the benefits of (fill in the blank), nobody is going to take operating strategies seriously;
- You cannot cut ribbons on day-to-day operations of a system;
- Operations—are you kidding? Our mayor is cutting back our traffic department; and
- Unless there is dedicated money, then operations does not stand a chance. It cannot compete against filling potholes.

Perhaps the most telling are the blank stares I get from some city or state traffic engineers. "What do you mean 'integrated operations'? We put the signals up and that seems to work pretty well."

The Rocky Terrain

Let us look a little closer at the environment where we are trying to have this discussion. Virtually all of the institutions that we know of today in surface transportation were born of or shaped by the mission of construction. Our state departments of transportation (DOTs) (where the dollars are) are primarily organized to get projects planned, designed and done. Our metropolitan planning organizations are designed to make decisions on capital programs. And our models are 20-year models—no wonder we cannot show the benefit of operating strategies.

All of our underpinning policy is based in building, projects, problems and

solutions. We define and measure success in our industry by cutting ribbons, or finishing a project, rather than by a press conference called to report on last quarter's performance measures. (Breathlessly awaited the way an Alan Greenspan report is awaited? I do not think so.)

Conflicts, issues and constituencies are all structured around this "project" or "construction" paradigm—even the environmentalists have structured their antiautomobile policy and constituency around the construction paradigm—because that is all there is! We as a profession struggle with the sheer institutional capacity to respond to this shift in the alignment of the political winds, public appetite, funding stream and emerging technological capability that is happening to us.

Few of Us Can See the Whole

Furthermore, where "operating a system" almost inherently means process—the integration of actions, systems, users, etc.—the lay of the land that has been created by the infrastructure paradigm is incredibly fragmented, by geography, mode, political jurisdiction, functional classification (collector vs. freeway) and by profession (planner, design engineer, traffic engineer, police, parking-lot entrepreneur, reporter).

Few can see the whole transportation paradigm whether it is the existing one based in construction or a potentially expanded one that includes operations (let alone contemplate a "seamless" end-to-end intermodal system of systems). People and their institutions and cultures have a hard time thinking outside of their boxes—that is within a box—that is within another box—to maybe see that a box is not the proper container at all!

So communicating an "operations vision," a system of systems, public and private, integrating planning, engineering and management that is meaningful to a state design engineer, a city traffic engineer, a planner, the police, a parking lot owner and the county highway engineer, based on performance rather than projects is challenging at best. Is anyone making it happen? Larry Dahms in San Francisco, Calif., USA, and Matt Edleman in New York/New Jersey, USA, have been working on it for a couple of decades! They are still working. (Please see Dahms' feature on pages 34–39 in this issue of *ITE Journal*.)

This is going to be incredibly hard because we cannot simply start from scratch. We cannot simply wipe out or ignore the institutional and physical infrastructure that exists. If we are to create an operations imperative, we will have to build on and from institutions that do not quite fit, cultures that do not align very well and policies and mind-sets that seem to be obstacles.

But do not forget all the forces that are aligned and pushing in this new direction! So, having assessed the lay of the land as difficult at best, what is the value-added federal role? How and where do we start?

What Is the Federal Policy Objective?

I would propose three federal "value added" policy objectives: 1) The development and nurturing of an "operations-friendly" policy framework; 2) Catalyzing the convening, networking and ultimately the institution building for an emerging family of operations stakeholders; and 3) Supporting the advancement of the art and science of surface transportation operations.

How Do We Get There?

Well, not all at once, and not necessarily directly. Since there needs to be a constituency before we make many policy changes, we probably start there. But I do not think we develop that constituency by doing the traditional federal "leadership" thing of articulating a long-term vision.

Instead I think we find some natural points of leverage in the existing institutions and existing cultures to gradually expand our thinking—our institutions, our cultures and our policies. I also think we need to put an amplifier on any consumer demand that exists to create more of a "market pull."

Top Down Points of Leverage

The National ITS Architecture consistency policy provides an important "top down" point of leverage:

- It requires getting a broad range of the new family of operations stakeholders together to think about what information and communications (operations) they want to be able to exchange;
- In the long run it is likely to require the development of a "concept of operations";
- Done well this may be a region's first operations plan and it may become the process for continuing operations planning; and
- Again, done well, it also can provide for an infrastructure that could pierce the institutional, jurisdictional and modal fragmentation with information and communications, enabling regular contact among the new family of stakeholders. Over time they will create their own "operations" culture, frame of reference and perhaps new institutions, which will be uniquely fitted to the local conditions.

The TEA-21 requirement to include operations in the planning process is another point of leverage. Certainly it will be a catalyst to engage in discussions across the United States about how it is being done now and how the process could be appropriately expanded. That dialogue alone will nudge our thinking a bit further.

Bottom Up Points of Leverage

While the architecture consistency discussions will hopefully cause some longer-range top down thinking and discussion, there is much that can be done in the "trenches" with immediate payoff to the customer and longer-range payoff to the tasks of institution and constituency building.

- Work Zones. The National Personal Transportation Survey suggests, interestingly, that while people are relatively tolerant of "normal" congestion, they are "mad as hell" over the delays caused by work zones. And the increased TEA-21 funding promises a 40 percent increase in them!

  By taking on this problem, and making a meaningful improvement we make several important long-range advances in operations:
  - Creating tools (models) that simulate the effects of various construction and contracting

alternatives on traffic, and weigh their cost against the cost of user delay and frustration;
- Develop the "habit" of routinely building permanent (legacy) traffic-operations infrastructure into the project to initially manage traffic during the construction period and then to operate it as part of a larger system; and
- Developing excellent traffic-operations planning, including comprehensive public communication as a part of every construction job.

In each case, we advance the state of the operations art within the institutions and culture that exists, while expanding our capacity for operating the system.

- Similarly expanding our capability in incident management so that quality improves with each incident, teams work more tightly together, and the "incidents" take on a broader and broader definition until we have worked our way into a high level of routine operations; and
- Other points of leverage might be emergency planning and response, special-event planning, HOV operations, weather responsiveness and the like.

Giving Customers a Megaphone

Another important role that I think we might be able to play at the federal level is, in effect, giving customers a megaphone as a means of amplifying the political support to invest in transportation systems operations.

One approach is to find a measure that is a good surrogate for the customer's point of view, for how well the system is being operated—one that resonates with both his frustration in using the system, as well as his satisfaction. Those measures are somewhat different than the diagnostic measures that we as transportation professionals might use to monitor system operation, then support collecting the data and periodically reporting to customers at regional and national levels about how well we are doing.

We see the seeds of this in the Texas Transportation Institute's congestion index that is often used by members of Congress, mayors and the media as a misery index. (For example, think of how sophisticated we have become with weather and temperature/humidity indices or the wind-chill index.)

At the same time we must also invest in the development of modeling or simulation tools that will relate operating strategies to movement in such indices. Let us couple that "report card" of public accountability with opening up the possibility, at least, of satisfying the public's appetite for information. If the Federal Communications Commission grants the U.S. DOT petition for a universal transportation N11 telephone number, I think we have opened up a brand new relationship with the public.

My guess is that there will be a lot less focus on the big capital expenditures that go into the structures that hold up overhead message signs and a lot more focus on getting accurate "value-added" information and getting it in an understandable format out to the public.

The federal role will be to put a national spotlight on those cities, states and regions that are satisfying the public appetite for traffic information and encouraging mayors and governors to ask the question: Why don't we have that in our state or city?

CONCLUSION

The development of an "operations" paradigm within the industry is critically important to the quality and effectiveness of our transportation system in the next century. Many things point to its potential birth, but underestimating the difficulty to achieve this could be fatal. I have outlined a few steps that the federal government can take, including catalyzing stakeholder discussions, developing a consensus on operating measures and expanding what we are doing well to a larger vision. These will help develop an environment that underpins a more operations friendly policy in the next renewal of the surface transportation legislation.

But the federal government cannot do this alone—we can only play a part. You also play a crucial role—your actions together in your associations and your actions as individual players back on the job.

You will be hearing much more about operations and the promise of optimizing performance of the transportation system in the next few months and years, and you will have opportunities to be involved. Please take the opportunity to become engaged and contribute to the future of the industry. ■

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